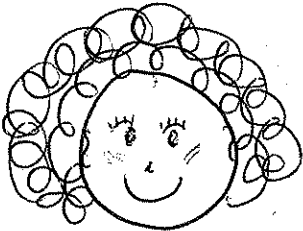


# Permutations

- an arrangement or listing of objects in which **order is important**.



If I get a perm, the order of steps is definitely important!

**Factorial** – the expression  $n!$  (“ $n$  factorial”)

The product of all counting numbers beginning with  $n$  and counting backward to 1.

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

**Yin, Sue and Rosita compete against each other in a race. How many different finishes are possible?**

Sue	Sue	Yin	Yin	Rosita	Rosita
Yin	Rosita	Sue	Rosita	Sue	Yin
Rosita	Yin	Rosita	Sue	Yin	Sue

**Therefore, 6 different finishes.**

$$3! = 3 \times 2 \times 1 \quad (\text{Use 3 factorial because order matters})$$

$$= 6 \text{ different ways}$$

\*\*\*\*\*

In general,  $P(n,r)$  or  $nPr$  means –  
the number of permutations of  $n$  things taken  $r$  at a time.  
(\* $r$  is rate)

5 things taken 3 at a time  $P(5,3)$

$$P(5,3) = 5 \times 4 \times 3$$

$$= 60 \text{ ways}$$